

**CLAIMS**

What is claimed:

- 5 1. A method of treating idiopathic interstitial lung disease or a chronic obstructive airway disorder in a subject comprising administering to the subject a therapeutically effective amount of a neutralizing, high affinity TNF $\alpha$  antibody, such that said disorder is treated.
- 10 2. The method of claim 1, wherein the antibody is an isolated human antibody, or an antigen-binding portion thereof, that dissociates from human TNF $\alpha$  with a  $K_d$  of  $1 \times 10^{-8}$  M or less and a  $K_{off}$  rate constant of  $1 \times 10^{-3} \text{ s}^{-1}$  or less, both determined by surface plasmon resonance, and neutralizes human TNF $\alpha$  cytotoxicity in a standard *in vitro* L929 assay with an  $IC_{50}$  of  $1 \times 10^{-7}$  M or less.
- 15 3. The method of claim 1, wherein the antibody is an isolated human antibody, or an antigen-binding portion thereof with the following characteristics:
- a) dissociates from human TNF $\alpha$  with a  $K_{off}$  rate constant of  $1 \times 10^{-3} \text{ s}^{-1}$  or less, as determined by surface plasmon resonance;
- 20 b) has a light chain CDR3 domain comprising the amino acid sequence of SEQ ID NO: 3, or modified from SEQ ID NO: 3 by a single alanine substitution at position 1, 4, 5, 7 or 8 or by one to five conservative amino acid substitutions at positions 1, 3, 4, 6, 7, 8 and/or 9;
- c) has a heavy chain CDR3 domain comprising the amino acid sequence of SEQ
- 25 ID NO: 4, or modified from SEQ ID NO: 4 by a single alanine substitution at position 2, 3, 4, 5, 6, 8, 9, 10 or 11 or by one to five conservative amino acid substitutions at positions 2, 3, 4, 5, 6, 8, 9, 10, 11 and/or 12.
4. The method of claim 1, wherein the antibody is an isolated human antibody, or
- 30 an antigen-binding portion thereof, with a light chain variable region (LCVR)

comprising the amino acid sequence of SEQ ID NO:1 and a heavy chain variable region (HCVR) comprising the amino acid sequence of SEQ ID NO: 2.

5. The method of any one of claims 1, 2, 3, or 4, wherein the antibody is D2E7.
- 5 6. The method of any one of claims 1, 2, 3, or 4, wherein the idiopathic interstitial lung disease is idiopathic pulmonary fibrosis.
7. The method of any one of claims 1, 2, 3, or 4, wherein the chronic obstructive  
10 airway disorder is asthma or chronic obstructive pulmonary disease (COPD).
8. A method of treating a subject suffering from an idiopathic interstitial lung disease comprising administering a therapeutically effective amount of a TNF $\alpha$  antibody, or an antigen-binding fragment thereof, to the subject, wherein the  
15 antibody dissociates from human TNF $\alpha$  with a  $K_d$  of  $1 \times 10^{-8}$  M or less and a  $K_{off}$  rate constant of  $1 \times 10^{-3} \text{ s}^{-1}$  or less, both determined by surface plasmon resonance, and neutralizes human TNF $\alpha$  cytotoxicity in a standard *in vitro* L929 assay with an  $IC_{50}$  of  $1 \times 10^{-7}$  M or less, such that the idiopathic interstitial lung disease is treated.
- 20 9. A method of treating a subject suffering from an idiopathic interstitial lung disease comprising administering a therapeutically effective amount a TNF $\alpha$  antibody, or an antigen-binding fragment thereof, with the following characteristics:
  - a) dissociates from human TNF $\alpha$  with a  $K_{off}$  rate constant of  $1 \times 10^{-3} \text{ s}^{-1}$  or less, as determined by surface plasmon resonance;
  - 25 b) has a light chain CDR3 domain comprising the amino acid sequence of SEQ ID NO: 3, or modified from SEQ ID NO: 3 by a single alanine substitution at position 1, 4, 5, 7 or 8 or by one to five conservative amino acid substitutions at positions 1, 3, 4, 6, 7, 8 and/or 9;
  - c) has a heavy chain CDR3 domain comprising the amino acid sequence of SEQ  
30 ID NO: 4, or modified from SEQ ID NO: 4 by a single alanine substitution at position 2, 3, 4, 5, 6, 8, 9, 10 or 11 or by one to five conservative amino acid substitutions at

positions 2, 3, 4, 5, 6, 8, 9, 10, 11 and/or 12, such that the idiopathic interstitial lung disease is treated.

10. A method of treating a subject suffering from an idiopathic interstitial lung  
5 disease comprising administering a therapeutically effective amount a TNF $\alpha$  antibody, or an antigen-binding fragment thereof, with a light chain variable region (LCVR) comprising the amino acid sequence of SEQ ID NO: 1 and a heavy chain variable region (HCVR) comprising the amino acid sequence of SEQ ID NO: 2, such that the idiopathic interstitial lung disease is treated.
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11. A method of treating a subject suffering from a chronic obstructive airway disorder comprising administering a therapeutically effective amount of a TNF $\alpha$  antibody, or an antigen-binding fragment thereof, to the subject, wherein the antibody dissociates from human TNF $\alpha$  with a  $K_d$  of  $1 \times 10^{-8}$  M or less and a  $K_{off}$  rate  
15 constant of  $1 \times 10^{-3} \text{ s}^{-1}$  or less, both determined by surface plasmon resonance, and neutralizes human TNF $\alpha$  cytotoxicity in a standard *in vitro* L929 assay with an  $IC_{50}$  of  $1 \times 10^{-7}$  M or less, such that the chronic obstructive airway disorder is treated.
12. A method of treating a subject suffering from a chronic obstructive airway  
20 disorder comprising administering a therapeutically effective amount a TNF $\alpha$  antibody, or an antigen-binding fragment thereof, with the following characteristics:
- a) dissociates from human TNF $\alpha$  with a  $K_{off}$  rate constant of  $1 \times 10^{-3} \text{ s}^{-1}$  or less, as determined by surface plasmon resonance;
  - b) has a light chain CDR3 domain comprising the amino acid sequence of SEQ  
25 ID NO: 3, or modified from SEQ ID NO: 3 by a single alanine substitution at position 1, 4, 5, 7 or 8 or by one to five conservative amino acid substitutions at positions 1, 3, 4, 6, 7, 8 and/or 9;
  - c) has a heavy chain CDR3 domain comprising the amino acid sequence of SEQ  
ID NO: 4, or modified from SEQ ID NO: 4 by a single alanine substitution at position 2,  
30 3, 4, 5, 6, 8, 9, 10 or 11 or by one to five conservative amino acid substitutions at

positions 2, 3, 4, 5, 6, 8, 9, 10, 11 and/or 12 such that the chronic obstructive airway disorder is treated.

13. A method of treating a subject suffering from a chronic obstructive airway  
5 disorder comprising administering a therapeutically effective amount a  $\text{TNF}\alpha$  antibody, or an antigen-binding fragment thereof, with a light chain variable region (LCVR) comprising the amino acid sequence of SEQ ID NO: 1 and a heavy chain variable region (HCVR) comprising the amino acid sequence of SEQ ID NO: 2 such that the chronic obstructive airway disorder is treated.

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14. The method of any one of claims 8 to 13, wherein the antibody, or antigen-binding fragment thereof, is D2E7.

15. The method of any one of claims 8, 9, or 10, wherein the idiopathic interstitial  
15 lung disease is idiopathic pulmonary fibrosis.

16. The method of any one of claims 11, 12, or 13, wherein the chronic obstructive airway disorder is asthma or COPD.

20 17. A method of treating a subject suffering from a pulmonary disorder selected from the group consisting of asthma, chronic obstructive pulmonary disease, and idiopathic pulmonary fibrosis comprising administering a therapeutically effective amount of a  $\text{TNF}\alpha$  antibody, or an antigen-binding fragment thereof, to the subject, wherein the antibody dissociates from human  $\text{TNF}\alpha$  with a  $K_d$  of  $1 \times 10^{-8}$  M or less and a  $K_{\text{off}}$  rate  
25 constant of  $1 \times 10^{-3} \text{ s}^{-1}$  or less, both determined by surface plasmon resonance, and neutralizes human  $\text{TNF}\alpha$  cytotoxicity in a standard *in vitro* L929 assay with an  $\text{IC}_{50}$  of  $1 \times 10^{-7}$  M or less, such that said pulmonary disorder is treated.

18. A method of treating a subject suffering from a pulmonary disorder selected from  
30 the group consisting of asthma, COPD, and idiopathic pulmonary fibrosis comprising

administering a therapeutically effective amount a TNF $\alpha$  antibody, or an antigen-binding fragment thereof, with the following characteristics:

- a) dissociates from human TNF $\alpha$  with a  $K_{off}$  rate constant of  $1 \times 10^{-3} \text{ s}^{-1}$  or less, as determined by surface plasmon resonance;
- 5        b) has a light chain CDR3 domain comprising the amino acid sequence of SEQ ID NO: 3, or modified from SEQ ID NO: 3 by a single alanine substitution at position 1, 4, 5, 7 or 8 or by one to five conservative amino acid substitutions at positions 1, 3, 4, 6, 7, 8 and/or 9;
- 10       c) has a heavy chain CDR3 domain comprising the amino acid sequence of SEQ ID NO: 4, or modified from SEQ ID NO: 4 by a single alanine substitution at position 2, 3, 4, 5, 6, 8, 9, 10 or 11 or by one to five conservative amino acid substitutions at positions 2, 3, 4, 5, 6, 8, 9, 10, 11 and/or 12, such that said pulmonary disorder is treated.

19.    A method of treating a subject suffering from a pulmonary disorder selected from  
15    the group consisting of asthma, COPD, and idiopathic pulmonary fibrosis comprising administering a therapeutically effective amount a TNF $\alpha$  antibody, or an antigen-binding fragment thereof, with a light chain variable region (LCVR) comprising the amino acid sequence of SEQ ID NO: 1 and a heavy chain variable region (HCVR) comprising the amino acid sequence of SEQ ID NO: 2, such that said pulmonary disorder is treated.

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20.    The method of any one of claims 17, 18, or 19, wherein the TNF $\alpha$  antibody, or antigen binding fragment thereof, is D2E7.

21.    The method of any one of claims 17, 18, or 19, wherein the TNF $\alpha$  antibody is  
25    administered with at least one additional therapeutic agent.

22.    A method for inhibiting human TNF $\alpha$  activity in a human subject suffering from an idiopathic interstitial lung disease comprising administering a therapeutically effective amount of a TNF $\alpha$  antibody, or an antigen-binding fragment thereof, to the  
30    subject, wherein the antibody dissociates from human TNF $\alpha$  with a  $K_d$  of  $1 \times 10^{-8} \text{ M}$  or less and a  $K_{off}$  rate constant of  $1 \times 10^{-3} \text{ s}^{-1}$  or less, both determined by surface plasmon

resonance, and neutralizes human TNF $\alpha$  cytotoxicity in a standard *in vitro* L929 assay with an IC<sub>50</sub> of  $1 \times 10^{-7}$  M or less.

23. The method of claim 22, wherein the idiopathic interstitial lung disease is  
5 idiopathic pulmonary fibrosis.

24. A method for inhibiting human TNF $\alpha$  activity in a human subject suffering from a chronic obstructive airway disorder comprising administering a therapeutically effective amount of a TNF $\alpha$  antibody, or an antigen-binding fragment thereof, to the  
10 subject, wherein the antibody dissociates from human TNF $\alpha$  with a K<sub>d</sub> of  $1 \times 10^{-8}$  M or less and a K<sub>off</sub> rate constant of  $1 \times 10^{-3}$  s<sup>-1</sup> or less, both determined by surface plasmon resonance, and neutralizes human TNF $\alpha$  cytotoxicity in a standard *in vitro* L929 assay with an IC<sub>50</sub> of  $1 \times 10^{-7}$  M or less.

15 25. The method of claim 24, wherein the chronic obstructive airway disorder is asthma or COPD.

26. The method of any one of claims 22 to 25, wherein the TNF $\alpha$  antibody, or antigen-binding fragment thereof, is D2E7.

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27. A method for inhibiting human TNF $\alpha$  activity in a human subject suffering from a pulmonary disorder selected from the group consisting of asthma, COPD, and idiopathic pulmonary fibrosis, comprising administering a therapeutically effective amount of a TNF $\alpha$  antibody, or an antigen-binding fragment thereof, to the subject,  
25 wherein the antibody dissociates from human TNF $\alpha$  with a K<sub>d</sub> of  $1 \times 10^{-8}$  M or less and a K<sub>off</sub> rate constant of  $1 \times 10^{-3}$  s<sup>-1</sup> or less, both determined by surface plasmon resonance, and neutralizes human TNF $\alpha$  cytotoxicity in a standard *in vitro* L929 assay with an IC<sub>50</sub> of  $1 \times 10^{-7}$  M or less.

30 28. The method of claim 27, wherein the antibody, or antigen binding fragment thereof, is D2E7.

29. A method of treating a subject suffering from an idiopathic interstitial lung disease comprising administering a therapeutically effective amount of D2E7, or an antigen-binding fragment thereof, to the subject, such that the disease is treated.

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30. The method of claim 29, wherein the idiopathic interstitial lung disease is idiopathic pulmonary fibrosis.

31. A method of treating a subject suffering from a chronic obstructive airway disorder comprising administering a therapeutically effective amount of D2E7, or an antigen-binding fragment thereof, to the subject, such that the disorder is treated.

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32. The method of claim 31, wherein the chronic obstructive airway disorder is asthma or COPD.

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33. A method of treating a subject suffering from a pulmonary disorder selected from the group consisting of asthma, idiopathic pulmonary fibrosis, and COPD comprising administering a therapeutically effective amount of D2E7, or an antigen-binding fragment thereof, to the subject, such that the disorder is treated.

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34. A method of treating a subject suffering from asthma, idiopathic pulmonary fibrosis, and COPD comprising administering a therapeutically effective amount of D2E7, or an antigen-binding fragment thereof, and at least one additional therapeutic agent to the subject, such that the disorder is treated.

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35. A kit comprising:

a) a pharmaceutical composition comprising a TNF $\alpha$  antibody, or an antigen binding portion thereof, and a pharmaceutically acceptable carrier; and

b) instructions for administering to a subject the TNF $\alpha$  antibody pharmaceutical composition for treating a subject who is suffering from asthma.

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36. A kit comprising:

a) a pharmaceutical composition comprising a TNF $\alpha$  antibody, or an antigen binding portion thereof, and a pharmaceutically acceptable carrier; and

5 b) instructions for administering to a subject the TNF $\alpha$  antibody pharmaceutical composition for treating a subject who is suffering from COPD.

37. A kit comprising:

a) a pharmaceutical composition comprising a TNF $\alpha$  antibody, or an antigen binding portion thereof, and a pharmaceutically acceptable carrier; and

10 b) instructions for administering to a subject the TNF $\alpha$  antibody pharmaceutical composition for treating a subject who is suffering from idiopathic pulmonary fibrosis.

38. A kit according to any one of claims 35, 36, or 37, wherein the TNF $\alpha$  antibody, or an antigen binding portion thereof, is D2E7.